tubes which contained large amounts of boiler scale were put into an otherwise faultless charge. The sulphur content of the metal was thereby so highly increased that it caused great trouble to overcome the red-shortness and make the material to some extent usable.
Nearly all fuels for producer working contain sulphur, which goes over into the gas as sulphurous acid, and then in the flame comes into most intimate contact with the charge. In the combustion chamber, a portion of the sulphurous acid is oxidised to sulphuric acid, which combines with the lime into lime sulphate. The latter can then be reduced by the iron, whereby the sulphur must go over into the metal.
Fortunately, there are generally forces at work in the furnace which oppose the taking up of sulphur from the gases of the flame, so that such can only seldom happen. This opposition is supplied by the manganese in the iron, which takes up the sulphur, and with it and iron forms a substance which is soluble in the slag as well as in the metal. Owing to this, the sulphur content divides itself between the two media, but MnS further has the property, in contact with free oxygen, of giving off the sulphur as SOa, which escapes from the furnace, so that the slag is robbed of its sulphur content, and thus new amounts of sulphur are able to reach it from the metal. Thus manganese acts in removal of sulphur from the iron, and this property is utilised partly in the mixer and also in the transfer ladle, and in the basic open-hearth furnace. In this connection, Dr. Kintzl6, of Aachen, has given examples in "Stahl und Eisen" of 1897, pp. 886 and 388, of which some are given in the table on p. 169.
One sees that owing to the manganese, large amounts of sulphur had already been removed in the transfer ladle, and the further removal of the same down to about one one-hundredth of 1 per cent, easily took place in the mixer. Complete removal of sulphur cannot be obtained in this way, as, according to Professor Osann, " with progressive desulphurisation such an increased inactivity in the course of reaction must follow that finally it requires such a large amount of time as is never practically at disposal."
In the basic open-hearth furnace, desulphurisation proceeds